WHAT IS CLAIMED IS:

1. An optical processing device, comprising:

an optical signal separator operable to direct an portion of an unmodulated optical signal for modulation; and

an array of variable blazed gratings located on one or more semiconductor substrates, the array of variable blazed gratings operable to receive the portion of unmodulated optical signal and to modulate that signal based at least in part on a control signal received from a controller.

2. The optical processing device of Claim 1, wherein the optical signal separator comprises a beam splitter.

3. The optical processing device of Claim 1, wherein the optical signal comprises a multiple wavelength optical signal and wherein at least some of the wavelengths comprises a different center wavelength.

4. The optical processing device of Claim 1, wherein the array of variable blazed gratings comprises:

one or more inner conductive layers; and

a plurality of approximately adjacent at least partially reflective mirror strips disposed outwardly from the one or more inner conductive layers, each strip operable to receive a portion of the potion of the unmodulated optical signal, wherein each of the plurality of strips is operable to undergo a partial rotation.

5. The optical processing device of Claim 4, wherein none of the strips has a width greater than 40 microns.

6. The optical processing device of Claim 4, wherein the strips are operable to undergo a maximum rotation that is greater than 2 degrees.

7. The optical processing device of Claim 1, wherein the one or more semiconductor substrates comprise silicon.

8. The optical processing device of Claim 1, wherein the controller is located on the semiconductor substrate.

9. The optical processing device of Claim 1, wherein the controller comprises an array of wavelength detectors operable to receive at least another portion of the unmodulated optical signal, the array of wavelength detectors operable to convert the another portion of the unmodulated signal into an electronic format.

10. The optical processing device of Claim 1, wherein the controller comprises an electronic processor coupled to the array of variable blazed gratings and operable to perform an electronic processing operation on at least another portion of the unmodulated optical signal.

11. The optical processing device of Claim 1, further comprising a delay line operable to receive at least another portion of the unmodulated optical signal and to delay transmission of that signal portion until another portion of the optical signal has been processed.

12. The optical processing device of Claim 1, further comprising one or more optical amplifiers capable of at least partially compensating for at least some of the losses associated with processing optical signals in the optical processing device.

13. The optical processing device of Claim 12, wherein the one or more optical amplifiers comprise discrete Raman amplifiers.

14. An optical processing device, comprising:

an array of variable blazed gratings located on one or more semiconductor substrates and operable to receive one or more optical signals from an optical signal separator, the array of variable blazed gratings operable to perform an optical signal processing operation on at least one of the one or more optical signals; and

a controller coupled to the array of variable blazed gratings, the controller operable to generate at least one control signal capable of affecting the optical signal processing performed on the at least one optical signal.

15. The optical processing device of Claim 14, wherein the optical signal separator comprises a beam splitter.

16. The optical processing device of Claim 14, wherein the optical signal comprises a multiple wavelength optical signal and wherein at least some of the wavelengths comprises a different center wavelength.

17. The optical processing device of Claim 14, wherein the array of variable blazed gratings comprises:

one or more inner conductive layers; and

a plurality of approximately adjacent at least partially reflective mirror strips disposed outwardly from the one or more inner conductive layers, each strip operable to receive a portion of the potion of the unmodulated optical signal, wherein each of the plurality of strips is operable to undergo a partial rotation.

18. The optical processing device of Claim 14, wherein the one or more semiconductor substrates comprise silicon.

19. The optical processing device of Claim 14, wherein the optical signal processing operation performed on the one or more optical signals is selected from the group consisting of variable attenuation, optical switching, and add/drop multiplexing.

20. The optical processing device of Claim 14, wherein the controller comprises an array of wavelength detectors operable to receive at least another portion of the unmodulated optical signal, the array of wavelength detectors operable to convert the another portion of the unmodulated signal into an electronic format.

21. The optical processing device of Claim 14, wherein the controller comprises an electronic processor coupled to the array of variable blazed gratings and operable to perform an electronic processing operation on at least another portion of the unmodulated optical signal.

22. The optical processing device of Claim 14, further comprising a delay line operable to receive at least another portion of the unmodulated optical signal and to delay transmission of that signal portion until another portion of the optical signal has been processed.

23. The optical processing device of Claim 14, further comprising one or more optical amplifiers capable of at least partially compensating for at least some of the losses associated with processing optical signals in the optical processing device.

24. The optical processing device of Claim 23, wherein the one or more optical amplifiers comprise discrete Raman amplifiers.

25. An optical processing element operable to receive and process one or more optical signals, the optical processing element comprising:

an optical signal separator operable to direct a portion of an optical signal for processing;

an array of variable blazed gratings located on one or more semiconductor substrates, the array of variable blazed gratings operable to perform an optical signal processing operation on at least the portion of the optical signal; and

an electronic processor coupled to the array of variable blazed gratings, the electronic processor operable to perform an electronic processing operation on at least a portion of the optical signal.

26. The optical processing device of Claim 25, wherein the array of variable blazed gratings comprises:

one or more inner conductive layers; and

a plurality of approximately adjacent at least partially reflective mirror strips disposed outwardly from the one or more inner conductive layers, each strip operable to receive a portion of the potion of the optical signal, wherein each of the plurality of strips is operable to undergo a partial rotation.

27. The optical processing device of Claim 25, wherein the one or more semiconductor substrates comprise silicon.

28. The optical processing device of Claim 25, wherein the optical signal processing operation performed on the one or more optical signals is selected from the group consisting of variable attenuation, optical switching, and add/drop multiplexing.

29. The optical processing device of Claim 25, further comprising a controller operable to generate at least one control signal capable of affecting the optical signal processing operation performed on the optical signal.

30. The optical processing device of Claim 29, wherein the controller comprises an array of wavelength detectors operable to receive at least another

portion of the optical signal, the array of wavelength detectors operable to convert the another portion of the unmodulated signal into an electronic format.

31. The optical processing device of Claim 25, further comprising a delay line operable to receive at least another portion of the optical signal and to delay transmission of that signal portion until another portion of the optical signal has been processed.

32. An optical processing device, comprising:

a separator operable to separate an input optical signal into one or more optical signal wavelengths; and

a linear array of variable blazed gratings located on one or more semiconductor substrates, each of the variable blazed gratings operable to perform an optical signal processing operation on at least one optical signal wavelength, the optical signal processing operation based at least in part on a control signal received from a controller.

33. The optical processing device of Claim 32, wherein the optical processing device performs a function selected from the group consisting of variable attenuation, an optical add/drop multiplexing, and an optical routing.

34. The optical processing device of Claim 32, wherein the separator is located on the semiconductor substrate.

35. The optical processing device of Claim 32, wherein at least one of the variable blazed gratings comprises:

an inner conductive layer; and

a plurality of approximately adjacent at least partially reflective mirror strips disposed outwardly from the inner conductive layer, each strip operable to receive at least a portion of the input optical signal, wherein each of the plurality of strips is operable to undergo a partial rotation.

36. The optical processing device of Claim 35, wherein none of the strips has a width greater than 40 microns.

37. The optical processing device of Claim 35, wherein the strips are operable to undergo a maximum rotation that is greater than 2 degrees.

38. The optical processing device of Claim 32, wherein the one or more semiconductor substrates comprise silicon.

32. An optical processing device, comprising:

a separator operable to separate an input optical signal into one or more optical signal wavelengths; and

a linear array of variable blazed gratings located on one or more semiconductor substrates, each of the variable blazed gratings operable to perform an optical signal processing operation on at least one optical signal wavelength, the optical signal processing operation based at least in part on a control signal received from a controller.

33. The optical processing device of Claim 32, wherein the optical processing device performs a function selected from the group consisting of variable attenuation, an optical add/drop multiplexing, and an optical routing.

34. The optical processing device of Claim 32, wherein the separator is located on the semiconductor substrate.

35. The optical processing device of Claim 32, wherein at least one of the variable blazed gratings comprises:

an inner conductive layer; and

a plurality of approximately adjacent at least partially reflective mirror strips disposed outwardly from the inner conductive layer, each strip operable to receive at least a portion of the input optical signal, wherein each of the plurality of strips is operable to undergo a partial rotation.

36. The optical processing device of Claim 35, wherein none of the strips has a width greater than 40 microns.

37. The optical processing device of Claim 35, wherein the strips are operable to undergo a maximum rotation that is greater than 2 degrees.

38. The optical processing device of Claim 32, wherein the one or more semiconductor substrates comprise silicon.

39. An optical processing device, comprising:

an array of variable blazed gratings located on one or more semiconductor substrates, the array of variable blazed gratings operable to receive at least a portion of an unmodulated optical signal and to modulate that signal based at least in part on a control signal received from a controller; and

an optical reflector operable to receive the modulated optical signal and to direct the modulated optical signal to an output.

40. The optical processing device of Claim 39, wherein the optical reflector comprises a mirror.

41. The optical processing device of Claim 39, wherein at least one of the variable blazed gratings comprises:

an inner conductive layer; and

a plurality of approximately adjacent at least partially reflective mirror strips disposed outwardly from the inner conductive layer, each strip operable to receive at least a portion of the input optical signal, wherein each of the plurality of strips is operable to undergo a partial rotation.

42. The optical processing device of Claim 39, wherein the one or more semiconductor substrates comprise silicon.